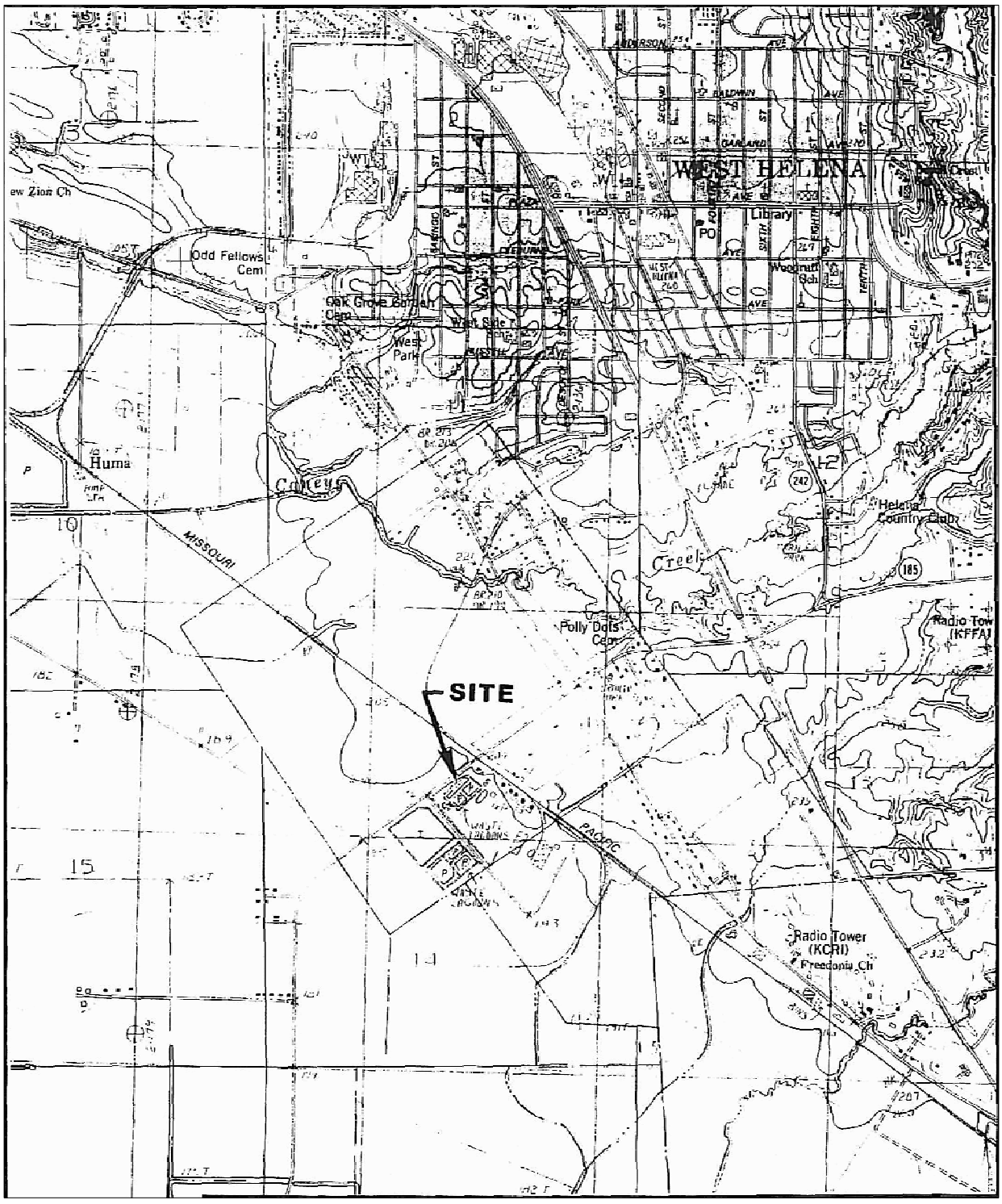


SOURCE: EnSafe, Phase II Investigation Report, 1995

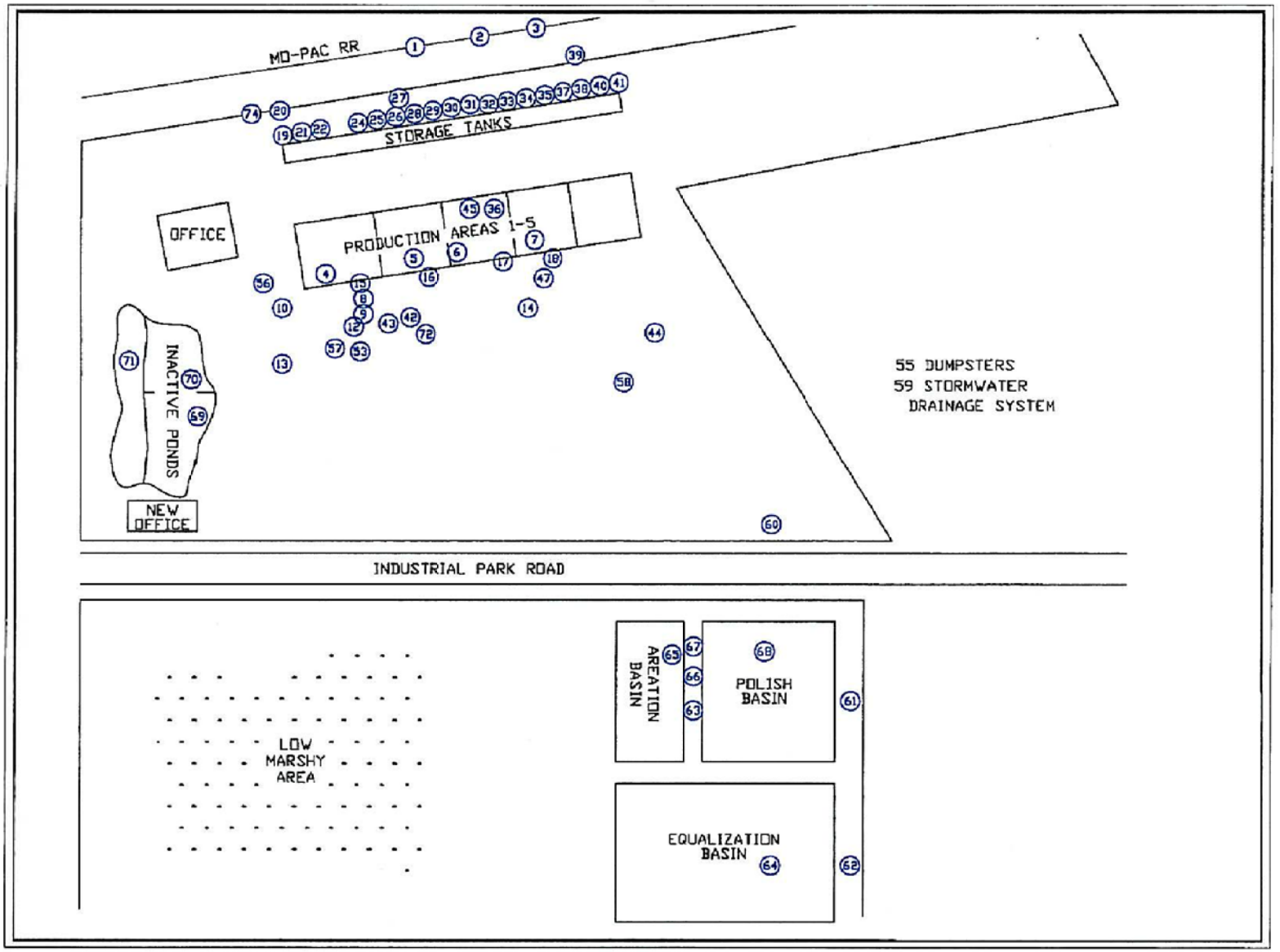
9545263

SITE LOCATION MAP

Cedar Chemical
Helena-West Helena, Arkansas

AMEC Geomatrix	Project 13636	Figure 1

I:\13636 - Arkansas Helena-West Helena\2007 CCR\FINAL FIGURES\ FIG 1 Site Location Map\FIG 1.dwg



SOURCE: EnSafe 1993 FI Report

SWMUs and AOCs IDENTIFIED IN USEPA REGION 6 PR/VSI

Cedar Chemical
Helena-West Helena, Arkansas

Figure XXX

I:\13636 - Arkansas Helena-West Helena\2007 CCR\FINAL FIGURES\ FIG 5 SWMUs and AOCs\FIG 5.dwg

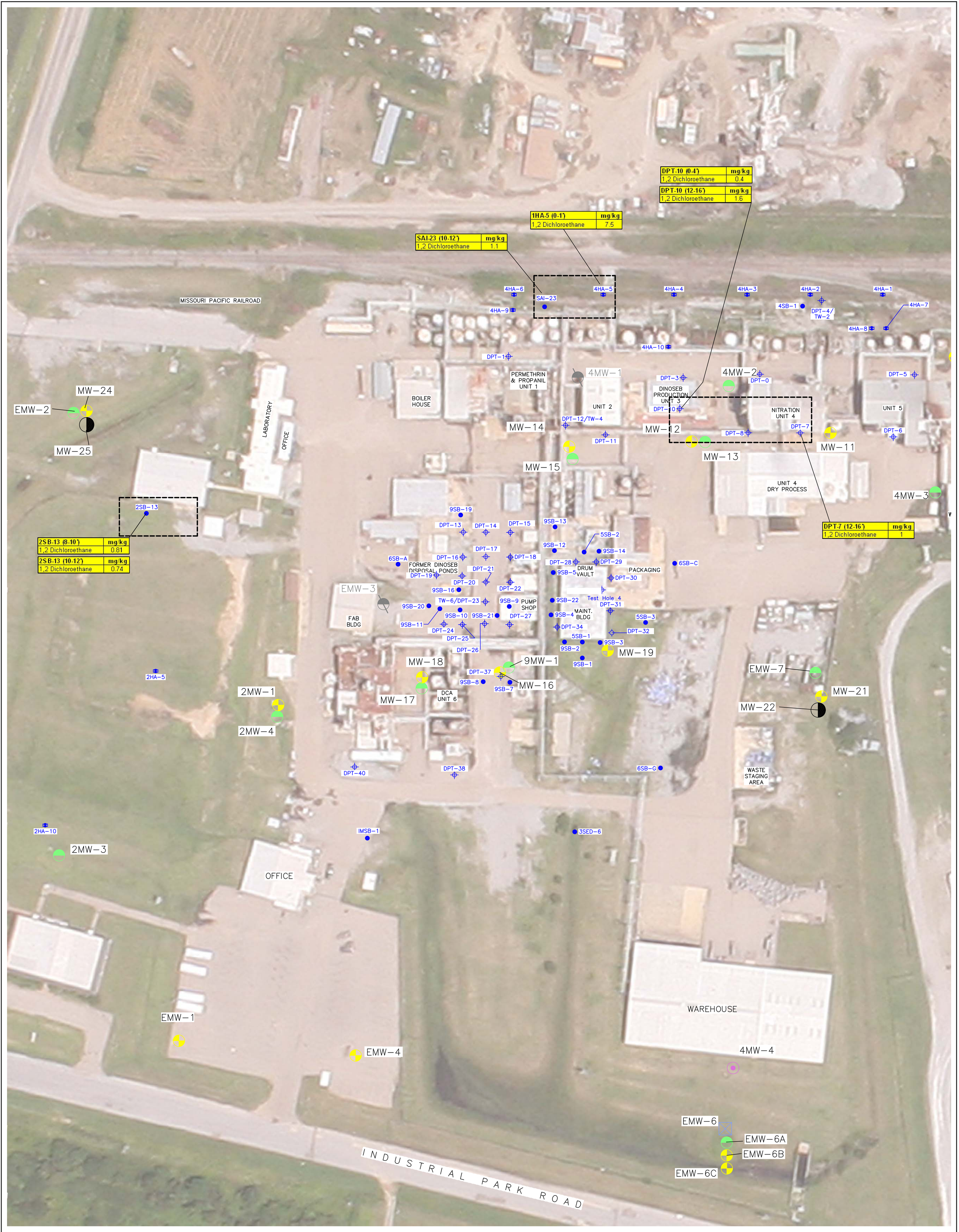
BASEMAP MODIFIED FROM:
Smith & Weiland/Cline-Fraizer Survey, August 2008

0 80
APPROXIMATE SCALE IN FEET

Facility Structure Locations

Cedar Chemical
Helena-West Helena, Arkansas

Figure XX



BASEMAP MODIFIED FROM:
Smith & Weiland/Cline-Fraizer Survey, August 2008

Risk Screening Criteria:
All soil COCs were compared to USEPA 2007 Outdoor Worker Soil Vapor Intrusion screening levels. Risk Based Screening Levels were developed from this comparison.

COC	Vapor Intrustion Risk Based Screening Level (mg/kg)
1,2-Dichloroethane	0.354

COC — SAI-23 (10-12') | mg/kg | 1,2 Dichloroethane | 1.1

Sample ID with Depth

Concentration of Analytes Detected Above RBSL

EXPLANATION

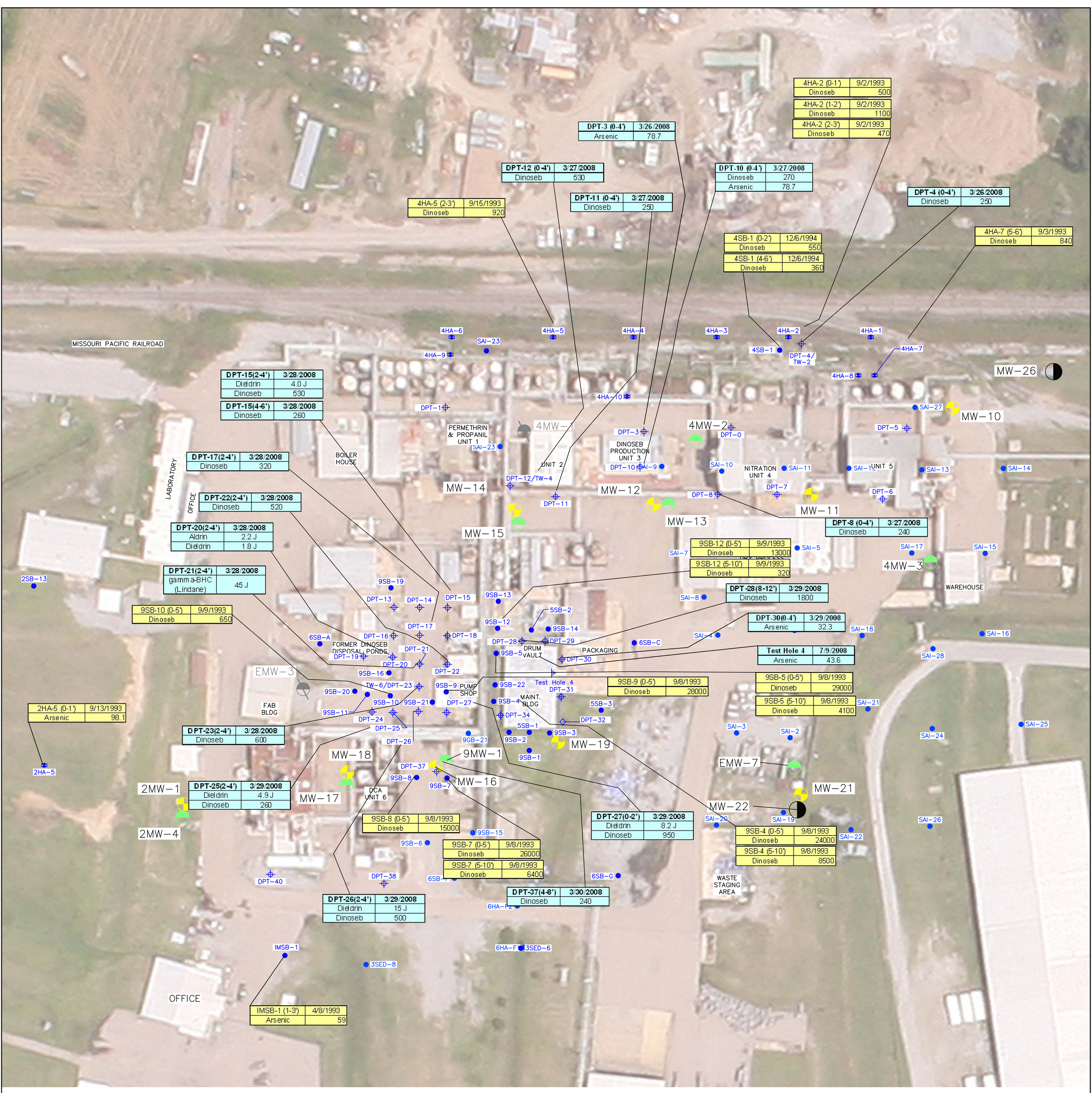
0 50
APPROXIMATE SCALE IN FEET

- Perched Zone Well Location
- Upper Alluvial Aquifer Well Location
- Middle Alluvial Aquifer Well Location
- Lower Alluvial Aquifer Well Location
- CMT Alluvial Aquifer Well with multiple completions (depths noted above)
- Plugged and Abandoned Well
- DPT Soil Sample Location
- Vapor Intrusion Exposure Controls Necessary

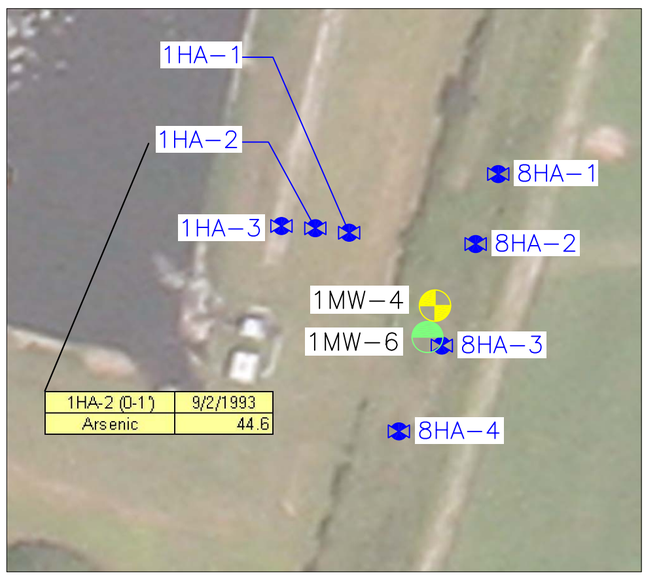
Constituents of Concern Above Vapor Intrusion-Based Risk Screening Levels in On-Site Soils

Cedar Chemical
Helena-West Helena, Arkansas

Figure XX



WASTEWATER TREATMENT POND AREA



Risk Screening Criteria:
All soil COCs were compared to USEPA 2007 Outdoor Worker Soil screening levels. Risk Based Screening Levels were developed from this comparison.

Analyte	Most Conservative Risk Based Screening Level (mg/kg)
Aldrin	1.01
Arsenic	16
Dieldrin	1.08
gamma-BHC (Lindane)	20.6
Dinoseb	238

	Data from FI Report
	Data from CCR Report

9SB-12 (5-10') 9/9/1993
Dinoseb 320

Sample ID with Depth
Sample Date
Concentration of Analytes Detected Above RBSL

All soil analytical results shown are in milligrams per kilogram (mg/kg).

J Estimated concentration for analyte.

0 50
APPROXIMATE SCALE IN FEET

Perched Zone Well Location

Upper Alluvial Aquifer Well Location

Middle Alluvial Aquifer Well Location

Lower Alluvial Aquifer Well Location

CMT Alluvial Aquifer Well with multiple completions (depths noted above)

Plugged and Abandoned Well

DPT Soil Sample Location

Constituents of Concern Above
Direct Contact-Based Risk Screening Levels
in On-Site Soils

Cedar Chemical
Helena-West Helena, Arkansas

Figure XX

TW-3	µg/l
1,2-Dichloroethane	37000

TW-4	µg/l
Chloroform	13000

MW-18	µg/l
1,2-Dichloroethane	120000

TW-10	µg/l
1,2-Dichloroethane	730000

BASEMAP MODIFIED FROM:
Smith & Weiland/Cline-Fraizer Survey, August 2008

EXPLANATION

Risk Screening Criteria:
All groundwater COCs were compared to USEPA 2007 groundwater screening levels. Risk Based Screening Levels were developed from this comparison.

COC	Vapor Intrustion Risk Based Screening Level (µg/l)
1,2-Dichloroethane	14840
Chloroform	8940

Perched Zone Well Location

Upper Alluvial Aquifer Well Location

Middle Alluvial Aquifer Well Location

Lower Alluvial Aquifer Well Location

CMT Alluvial Aquifer Well with multiple completions (depths noted above)

Plugged and Abandoned Well

DPT Temporary Well Groundwater Sample Location

Vapor Intrusion Exposure Controls Necessary.

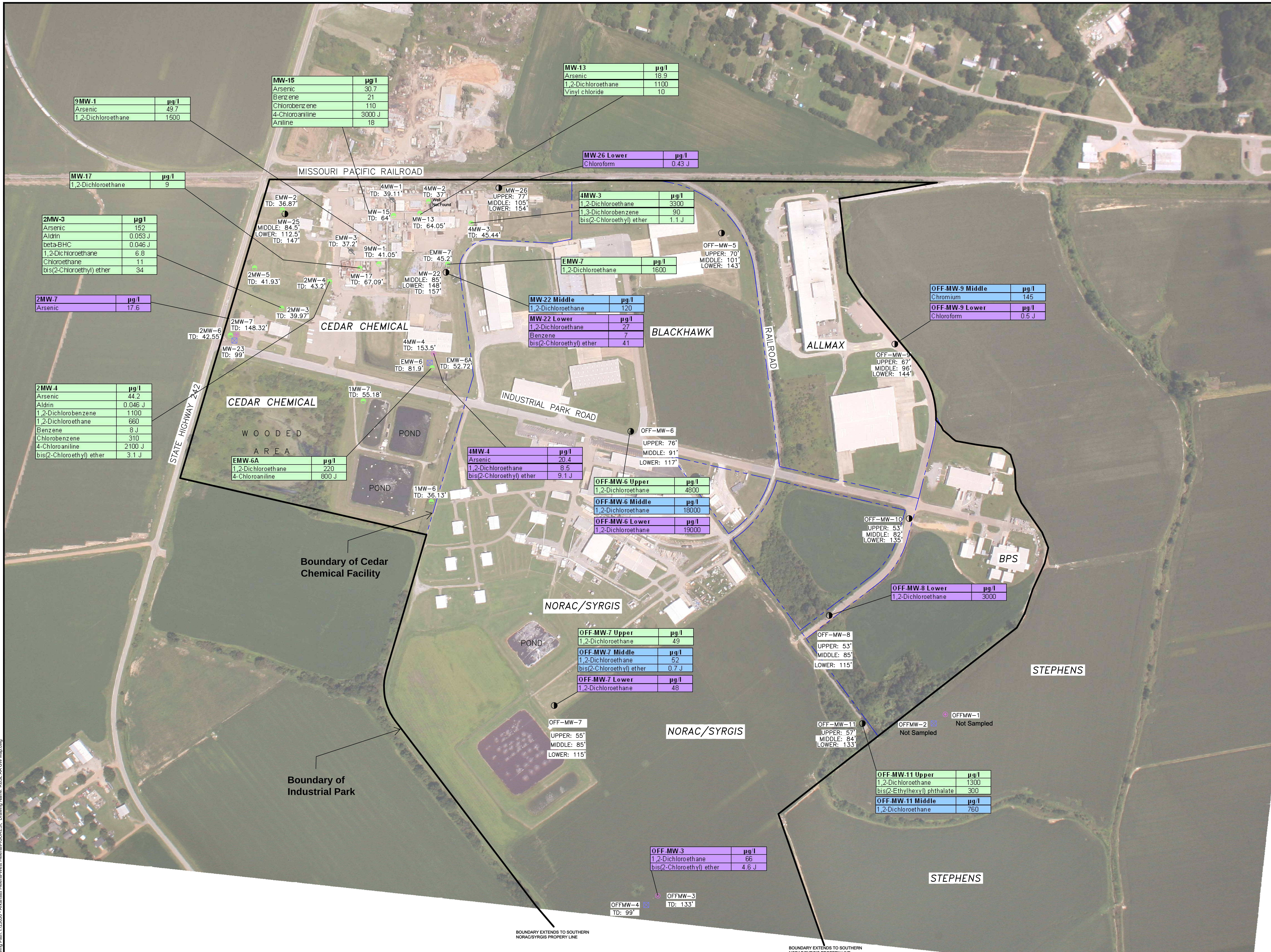
µg/l micrograms per liter

0 80
APPROXIMATE SCALE IN FEET

Constituents of Concern Above Vapor Intrusion-Based Risk Screening Levels in Perched Zone Groundwater

Cedar Chemical
Helena-West Helena, Arkansas

Figure XX


MISSOURI PACIFIC RAILROAD
STATE HIGHWAY 242
INDUSTRIAL PARK ROAD
RAILROAD
CEDAR CHEMICAL
CEDAR CHEMICAL
WOODED AREA
POND
POND
POND
BLACKHAWK
ALLMAX
BPS
NORAC/SYRGIS
NORAC/SYRGIS
STEPHENS
STEPHENS
Boundary of Cedar Chemical Facility
Boundary of Industrial Park
BOUNDARY EXTENDS TO SOUTHERN NORAC/SYRGIS PROPERY LINE
BOUNDARY EXTENDS TO SOUTHERN NORAC/SYRGIS PROPERY LINE
9MW-1 µg/l
Arsenic 49.7
1,2-Dichloroethane 1500
MW-15 µg/l
Arsenic 30.7
Benzene 21
Chlorobenzene 110
4-Chloroaniline 3000 J
Aniline 18
MW-13 µg/l
Arsenic 18.9
1,2-Dichloroethane 1100
Vinyl chloride 10
MW-26 Lower µg/l
Chloroform 0.43 J
MW-17 µg/l
1,2-Dichloroethane 9
2MW-3 µg/l
Arsenic 152
Aldrin 0.053 J
beta-BHC 0.046 J
1,2-Dichloroethane 6.8
Chloroethane 11
bis(2-Chloroethyl) ether 34
4MW-3 µg/l
1,2-Dichloroethane 3300
1,3-Dichlorobenzene 90
bis(2-Chloroethyl) ether 1.1 J
EMW-7 µg/l
1,2-Dichloroethane 1600
2MW-7 µg/l
Arsenic 17.6
MW-22 Middle µg/l
1,2-Dichloroethane 120
MW-22 Lower µg/l
1,2-Dichloroethane 27
Benzene 7
bis(2-Chloroethyl) ether 41
OFF-MW-9 Middle µg/l
Chromium 145
OFF-MW-9 Lower µg/l
Chloroform 0.5 J
2MW-4 µg/l
Arsenic 44.2
Aldrin 0.046 J
1,2-Dichlorobenzene 1100
1,2-Dichloroethane 660
Benzene 8 J
Chlorobenzene 310
4-Chloroaniline 2100 J
bis(2-Chloroethyl) ether 3.1 J
EMW-6A µg/l
1,2-Dichloroethane 220
4-Chloroaniline 800 J
4MW-4 µg/l
Arsenic 20.4
1,2-Dichloroethane 8.5
bis(2-Chloroethyl) ether 9.1 J
OFF-MW-6 Upper µg/l
1,2-Dichloroethane 4800
OFF-MW-6 Middle µg/l
1,2-Dichloroethane 18000
OFF-MW-6 Lower µg/l
1,2-Dichloroethane 19000
OFF-MW-8 Lower µg/l
1,2-Dichloroethane 3000
OFF-MW-7 Upper µg/l
1,2-Dichloroethane 49
OFF-MW-7 Middle µg/l
1,2-Dichloroethane 52
bis(2-Chloroethyl) ether 0.7 J
OFF-MW-7 Lower µg/l
1,2-Dichloroethane 48
OFF-MW-11 Upper µg/l
1,2-Dichloroethane 1300
bis(2-Ethylhexyl) phthalate 300
OFF-MW-11 Middle µg/l
1,2-Dichloroethane 760
OFF-MW-3 µg/l
1,2-Dichloroethane 66
bis(2-Chloroethyl) ether 4.6 J
EMW-2 TD: 36.87'
MW-25 MIDDLE: 84.5' LOWER: 112.5' TD: 147'
4MW-1 TD: 39.11'
4MW-2 TD: 37' Well Not Found
MW-15 TD: 64'
MW-13 TD: 64.05'
MW-26 UPPER: 77' MIDDLE: 105' LOWER: 154'
4MW-3 TD: 45.44'
EMW-3 TD: 37.2'
9MW-1 TD: 41.05'
EMW-7 TD: 45.2'
MW-22 MIDDLE: 85' LOWER: 148' TD: 157'
2MW-5 TD: 41.93'
2MW-4 TD: 43.2'
MW-17 TD: 67.09'
2MW-3 TD: 39.97'
2MW-7 TD: 148.32'
2MW-6 TD: 42.55'
MW-23 TD: 99'
4MW-4 TD: 153.5'
EMW-6 TD: 81.9'
EMW-6A TD: 52.72'
1MW-7 TD: 55.18'
1MW-6 TD: 36.13'
OFF-MW-5 UPPER: 70' MIDDLE: 101' LOWER: 143'
OFF-MW-9 UPPER: 67' MIDDLE: 96' LOWER: 144'
OFF-MW-6 UPPER: 76' MIDDLE: 91' LOWER: 117'
OFF-MW-10 UPPER: 53' MIDDLE: 82' LOWER: 135'
OFF-MW-8 UPPER: 53' MIDDLE: 85' LOWER: 115'
OFF-MW-7 UPPER: 55' MIDDLE: 85' LOWER: 115'
OFF-MW-11 UPPER: 57' MIDDLE: 84' LOWER: 133'
OFFMW-2 Not Sampled
OFFMW-1 Not Sampled
OFFMW-4 TD: 99'
OFFMW-3 TD: 133'

EXPLANATION

Upper Alluvial Well Location

Middle Alluvial Well Location

Lower Alluvial Well Location

CMT Alluvial Well with multiple completions (screen depths noted)

Plugged and Abandoned Well

	Upper Alluvial Aquifer
	Middle Alluvial Aquifer
	Lower Alluvial Aquifer

Concentrations reported are from the most recent sampling event (Fall 2008).

Risk Screening Criteria:
All groundwater COCs were compared to higher of applicable USEPA 2007 Tapwater Media Specific Screening Level and MCL.

COC	Higher of MCL/Tap Water Screening Level* (µg/l)
1,2-Dichlorobenzene	600
1,2-Dichloroethane	5
1,3-Dichlorobenzene	15
4-Chloroaniline	150
Aldrin	0.004
Aniline	12
Arsenic	10
Benzene	5
beta-BHC	0.037
bis(2-Chloroethyl) ether	0.0098
bis(2-Ethylhexyl) phthalate	6
Chlorobenzene	100
Chloroethane	3.9
Chloroform	0.17
Chromium	100
Vinyl chloride	2

* 2007 USEPA Screening Table

0 125 250
Approximate Scale in Feet

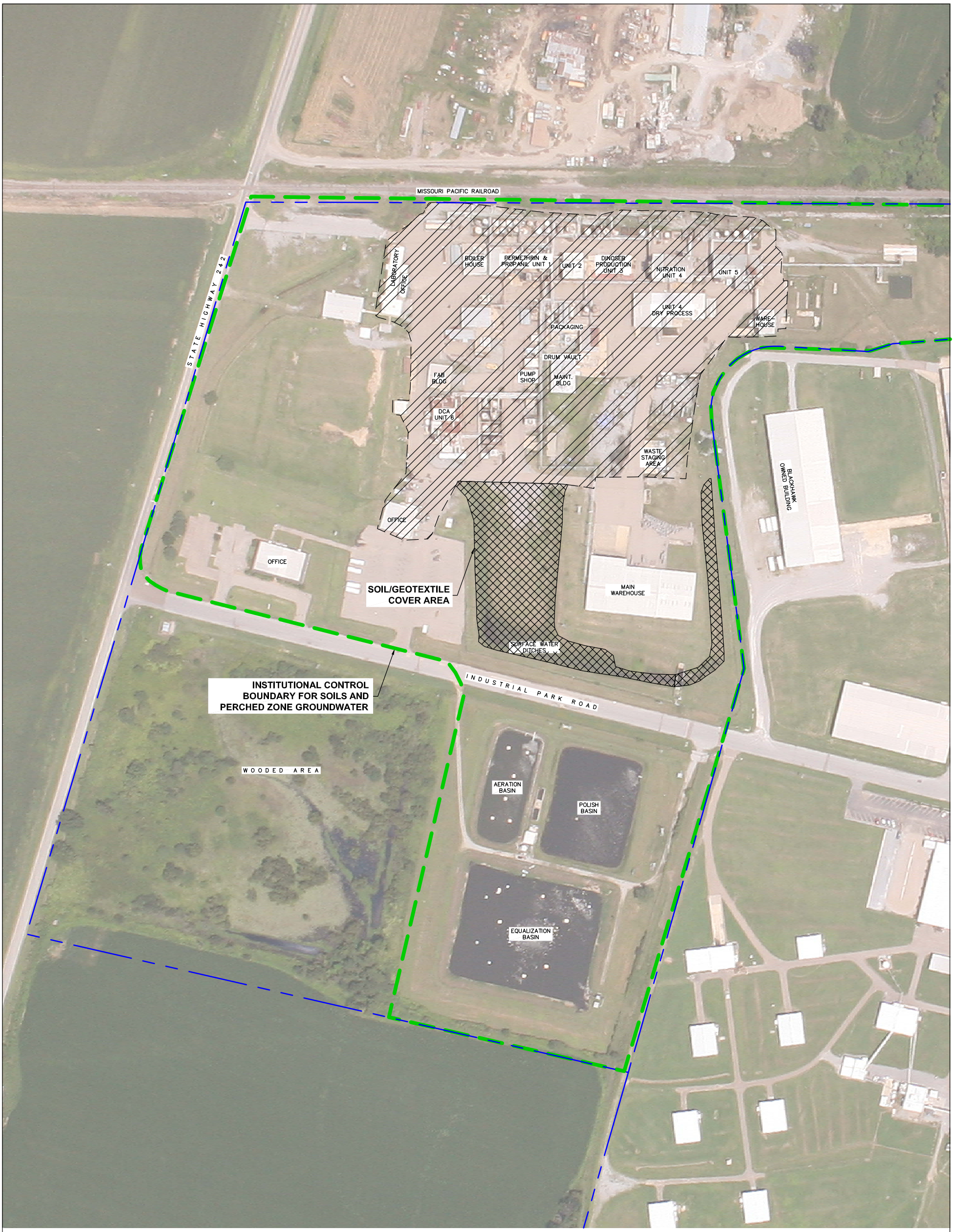
Constituents of Concern Above Ingestion-Based Risk Screening Levels in Alluvial Aquifer Groundwater

Cedar Chemical
Helena-West Helena, Arkansas

Figure XXX

Plot Date: 12/10/09 - 10:04am, Plotted by: mike.schofield
Drawing Path: I:\13636 - Arkansas Helena-West Helena\FIGURES\, Drawing Name: RBSL AA GW Map.dwg

2/10/09 RBSL AA GW Map.dwg



EXPLANATION

- SOIL COVER
- SOIL / GEOTEXTILE COVER AREA
- WASTEWATER TREATMENT POND CLOSURE AREA
- INSTITUTIONAL CONTROL
- PROPERTY BOUNDARY

NOTE: Boundaries, well locations, and remedy elements subject to change based on Remedial Design or other factors.

0 50 100
FEET

BASEMAP MODIFIED FROM:
Smith & Weiland/Cline-Fraizer Survey, August 2008

SOIL REMEDY ALTERNATIVE S1
Exposure Control
Cedar Chemical
Helena-West Helena, Arkansas

Figure XX

EXPLANATION

SOIL STABILIZATION AREA

PROPERTY BOUNDARY

0 50 100
FEET

BASEMAP MODIFIED FROM:
Smith & Weiland/Cline-Fraizer Survey, August 2008

NOTE: Boundaries, well locations, and remedy elements subject to change based on Remedial Design or other factors.

SOIL REMEDY ALTERNATIVE S2
In Situ Stabilization
Area-Wide Approach
Cedar Chemical
Helena-West Helena, Arkansas

Figure XX

EXPLANATION

SOIL STABILIZATION AREA

PROPERTY BOUNDARY

0 50 100
FEET

BASEMAP MODIFIED FROM:
Smith & Weiland/Cline-Fraizer Survey, August 2008

NOTE: Boundaries, well locations, and remedy elements subject to change based on Remedial Design or other factors.

SOIL REMEDY ALTERNATIVE S2
In Situ Stabilization
Focused Approach
Cedar Chemical
Helena-West Helena, Arkansas

Figure XX

EXPLANATION

SOIL EXCAVATION AREA

PROPERTY BOUNDARY

0 50 100
FEET

BASEMAP MODIFIED FROM:
Smith & Weiland/Cline-Fraizer Survey, August 2008

SOIL REMEDY ALTERNATIVE S3
Excavation with Off-Site Disposal as Solid Waste
Area-Wide Approach
Cedar Chemical
Helena-West Helena, Arkansas

Figure XX

NOTE: Boundaries, well locations, and remedy elements subject to change based on Remedial Design or other factors.

EXPLANATION

SITE EXCAVATION AREA

PROPERTY BOUNDARY

0 50 100
FEET

BASEMAP MODIFIED FROM:
Smith & Weiland/Cline-Fraizer Survey, August 2008

SOIL REMEDY ALTERNATIVE S3
Excavation with Off-Site Disposal as Solid Waste
Focused Approach
Cedar Chemical
Helena-West Helena, Arkansas

Figure XX

NOTE: Boundaries, well locations, and remedy elements subject to change based on Remedial Design or other factors.

EXPLANATION

- PIPING
- SOIL VAPOR EXTRACTION WELL
- PROPERTY BOUNDARY

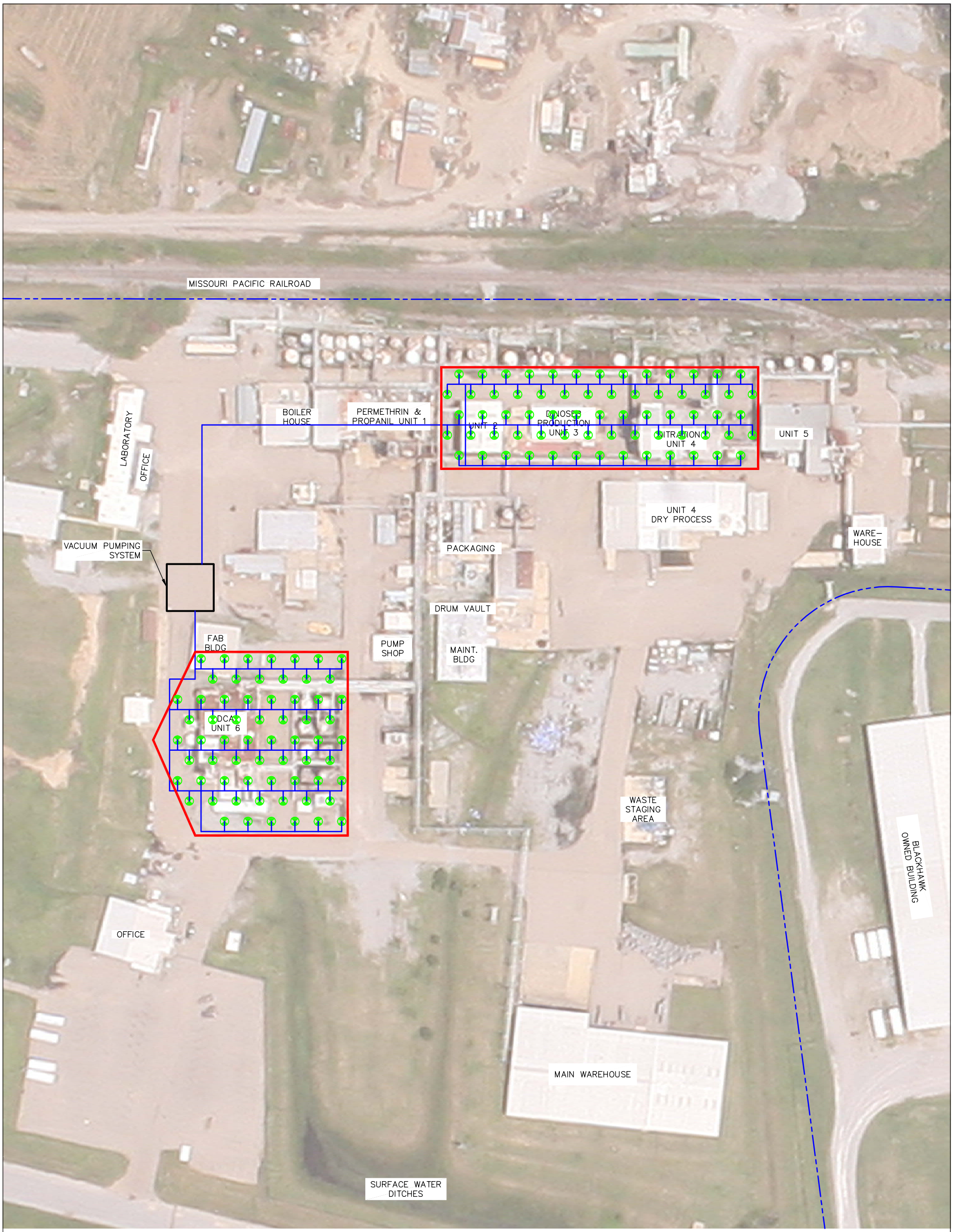
0 50 100
FEET

BASEMAP MODIFIED FROM:
Smith & Weiland/Cline-Fraizer Survey, August 2008

SOIL REMEDY ALTERNATIVE S4
Soil Vapor Extraction
Area-Wide Approach
Cedar Chemical
Helena-West Helena, Arkansas

Figure XX

NOTE: Boundaries, well locations, and remedy elements subject to change based on Remedial Design or other factors.



EXPLANATION

PROPERTY BOUNDARY

PIPING

SOIL VAPOR EXTRACTION WELL

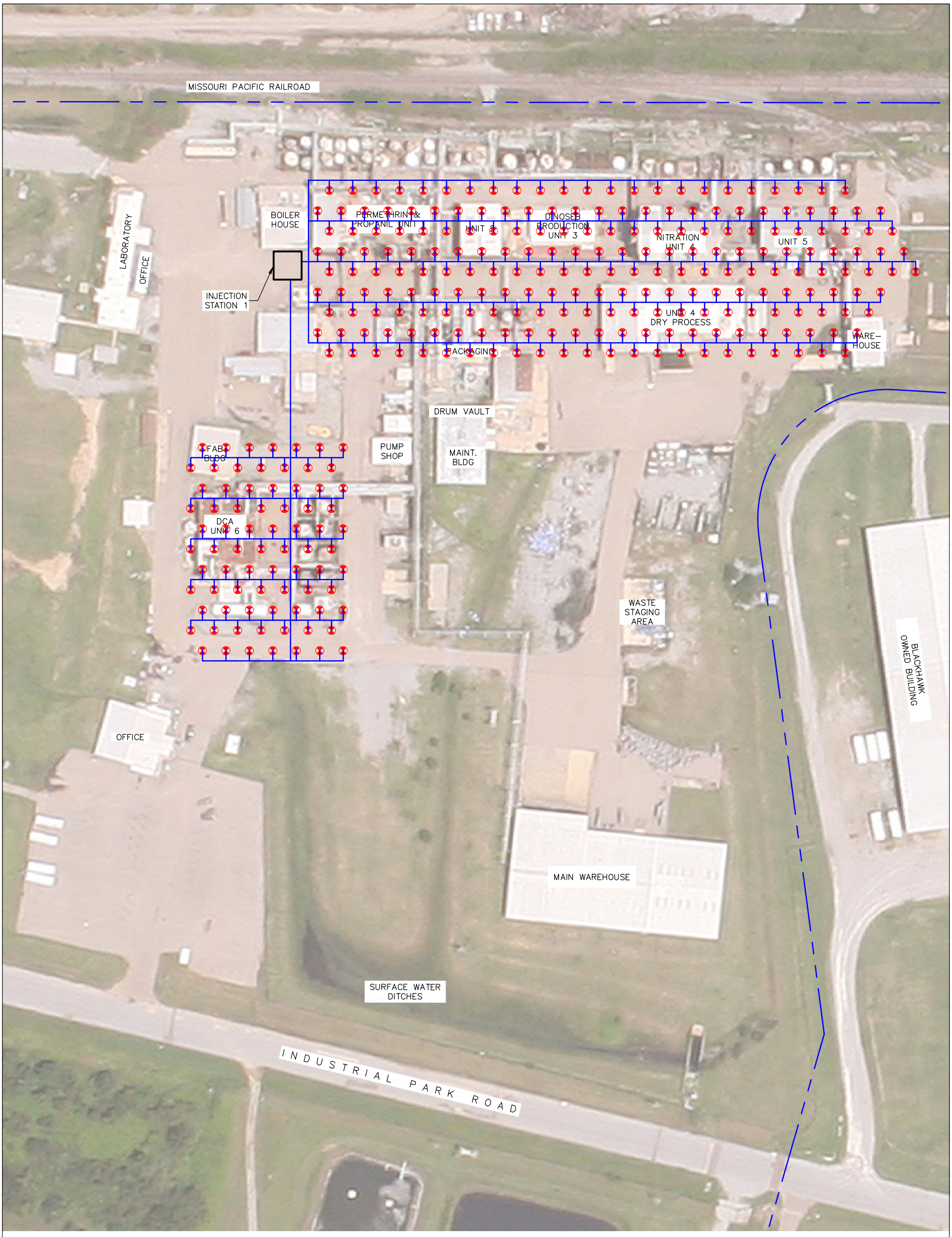
0 50 100
FEET

BASEMAP MODIFIED FROM:
Smith & Weiland/Cline-Fraizer Survey, August 2008

NOTE: Boundaries, well locations, and remedy elements subject to change based on Remedial Design or other factors.

SOIL REMEDY ALTERNATIVE S4
Soil Vapor Extraction
Focused Approach
Cedar Chemical
Helena-West Helena, Arkansas

Figure XX



EXPLANATION

- INJECTION WELL CLUSTER (3 WELLS PER CLUSTER)
- PIPING
- PROPERTY BOUNDARY

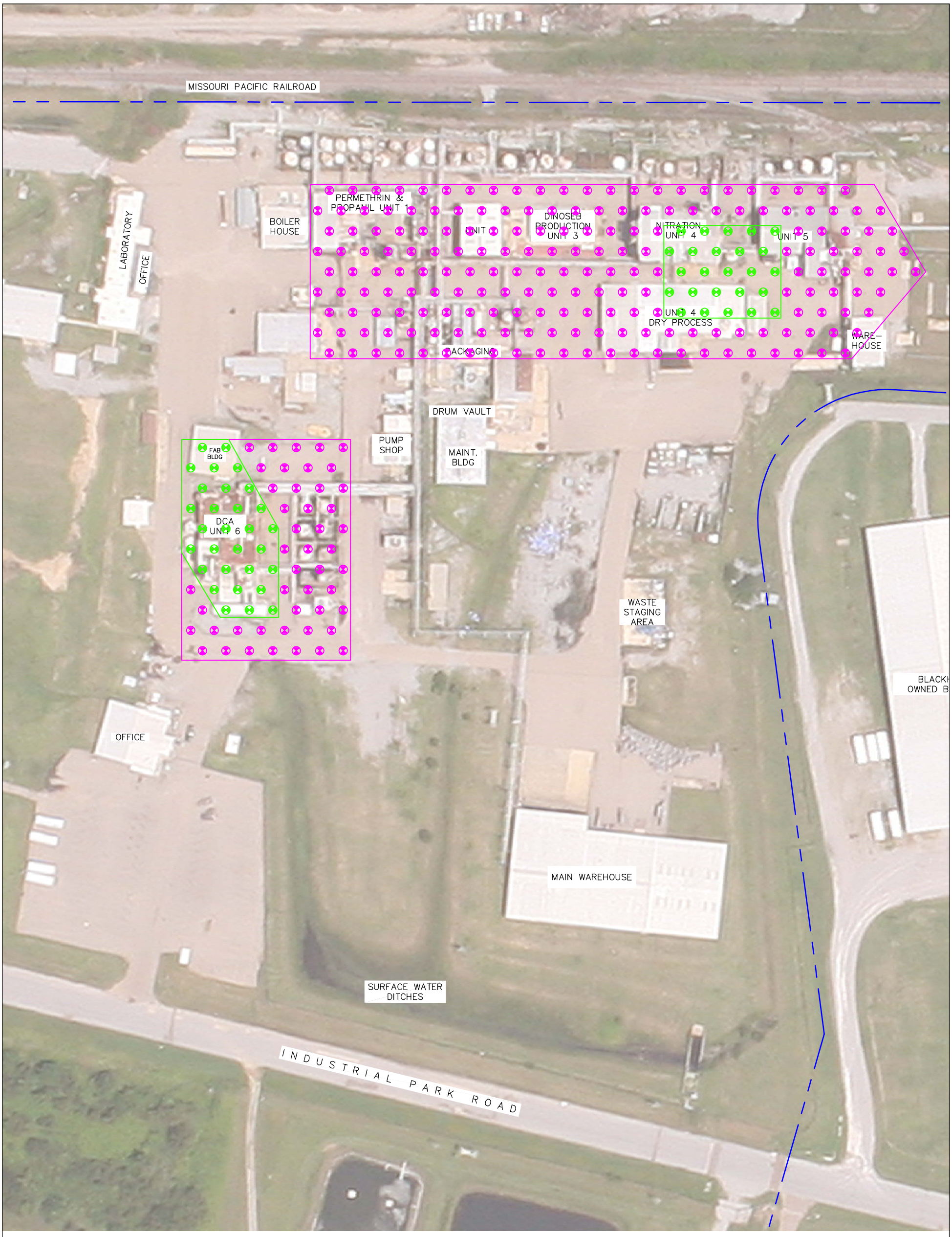
0 50 100
FEET

BASEMAP MODIFIED FROM:
Smith & Weiland/Cline-Fraizer Survey, August 2008

PERCHED ZONE GROUNDWATER
REMEDY ALTERNATIVE P3
In Situ Chemical Oxidation
Cedar Chemical
Helena-West Helena, Arkansas

Figure XX

NOTE: Boundaries, well locations, and remedy elements subject to change based on Remedial Design or other factors.



EXPLANATION

INJECTION WELLS AT 20' SPACING

INJECTION WELLS AT 40' - 50' SPACING

PROPERTY BOUNDARY

N

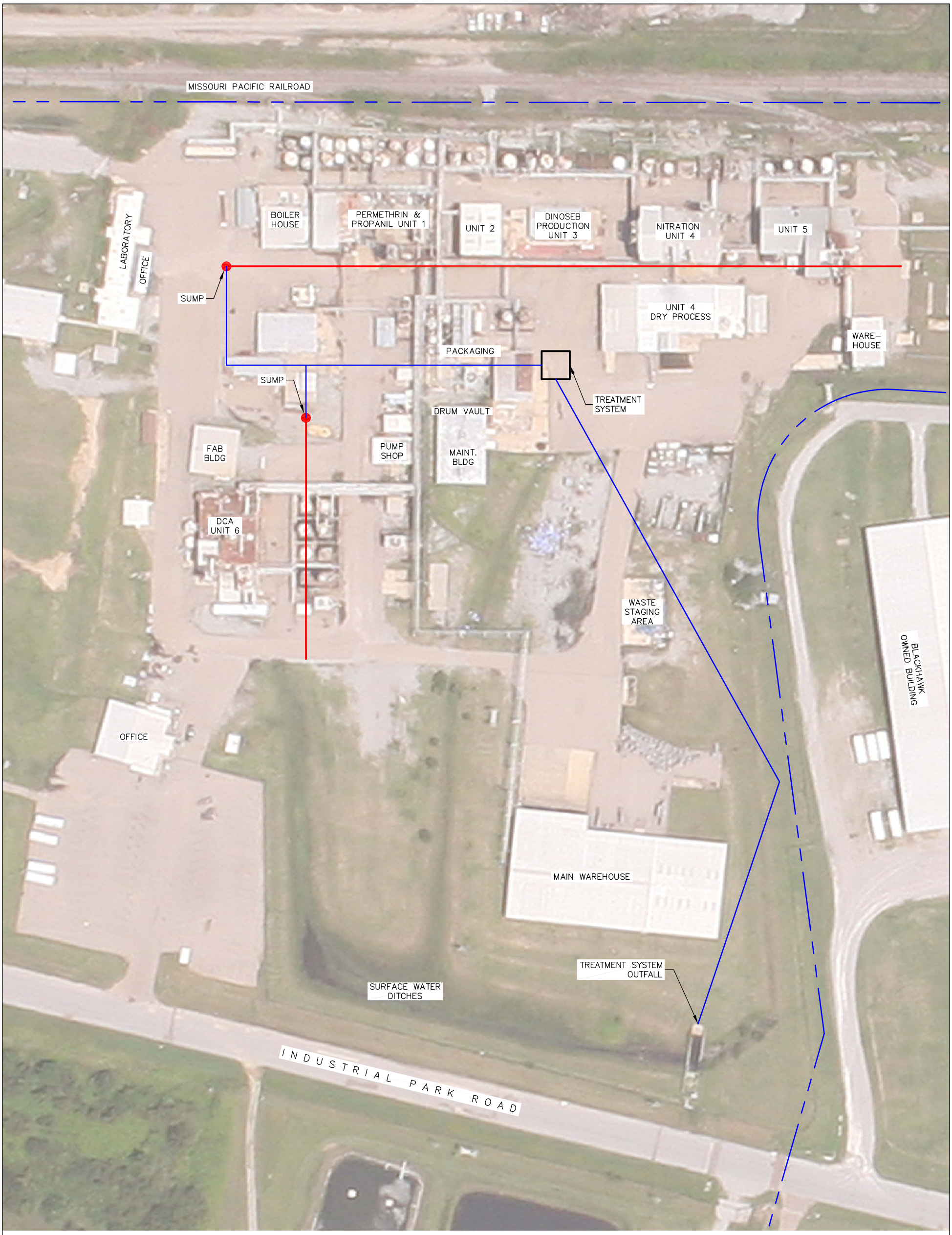
0 50 100
FEET

BASEMAP MODIFIED FROM:
Smith & Weiland/Cline-Fraizer Survey, August 2008

PERCHED ZONE GROUNDWATER
REMEDY ALTERNATIVE P4
In Situ Enhanced Biodegradation
Cedar Chemical
Helena-West Helena, Arkansas

Figure XX

NOTE: Boundaries, well locations, and remedy elements subject to change based on Remedial Design or other factors.



EXPLANATION

- PROPERTY BOUNDARY
- PUMPING TRENCH
- PIPING
- SUMP

N

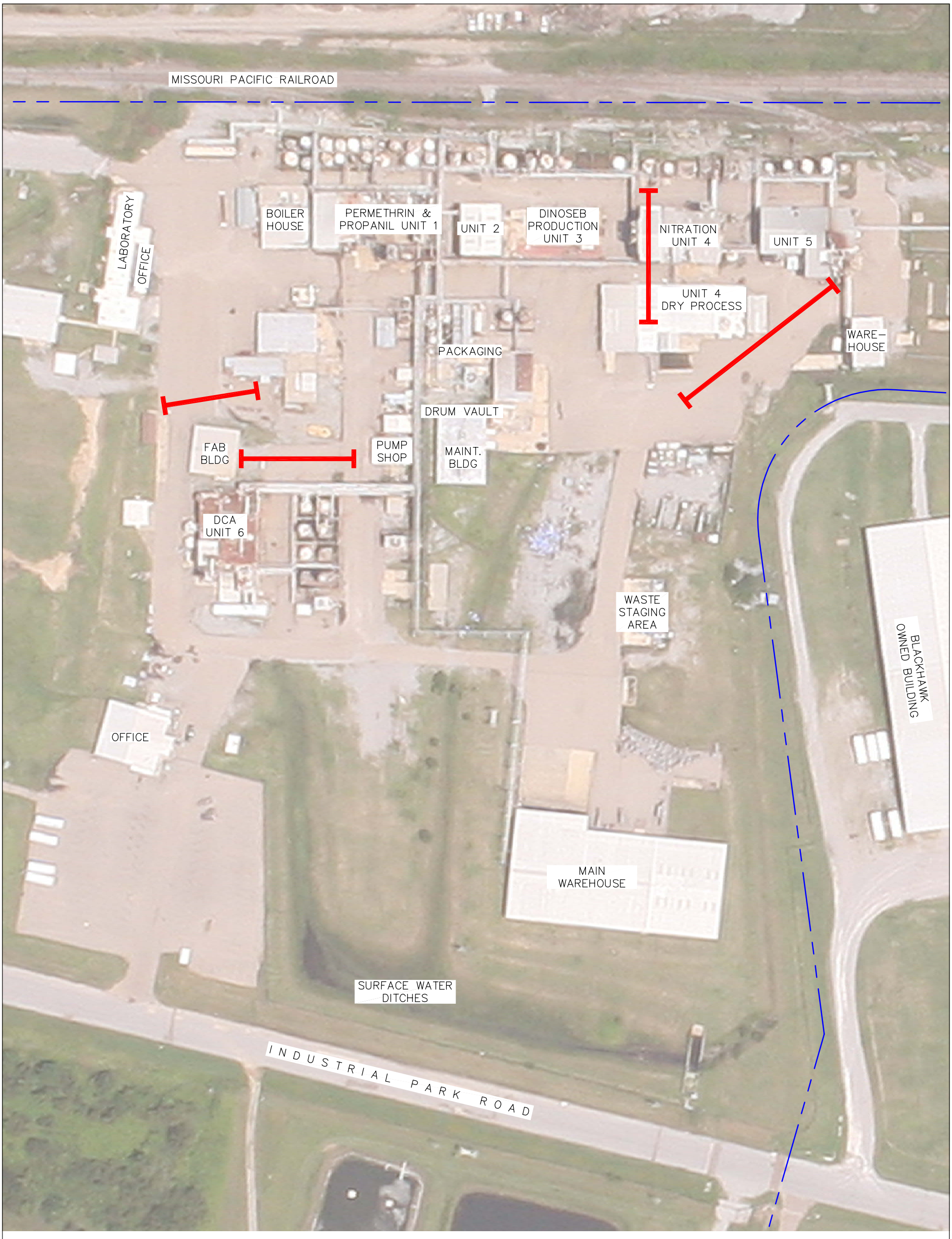
0 50 100
FEET

BASEMAP MODIFIED FROM:
Smith & Weiland/Cline-Fraizer Survey, August 2008

NOTE: Boundaries, well locations, and remedy elements subject to change based on Remedial Design or other factors.

PERCHED ZONE GROUNDWATER
REMEDY ALTERNATIVE P5
Hydraulic Control
Cedar Chemical
Helena-West Helena, Arkansas

Figure XX



EXPLANATION

PERMEABLE REACTIVE BARRIER

PROPERTY BOUNDARY

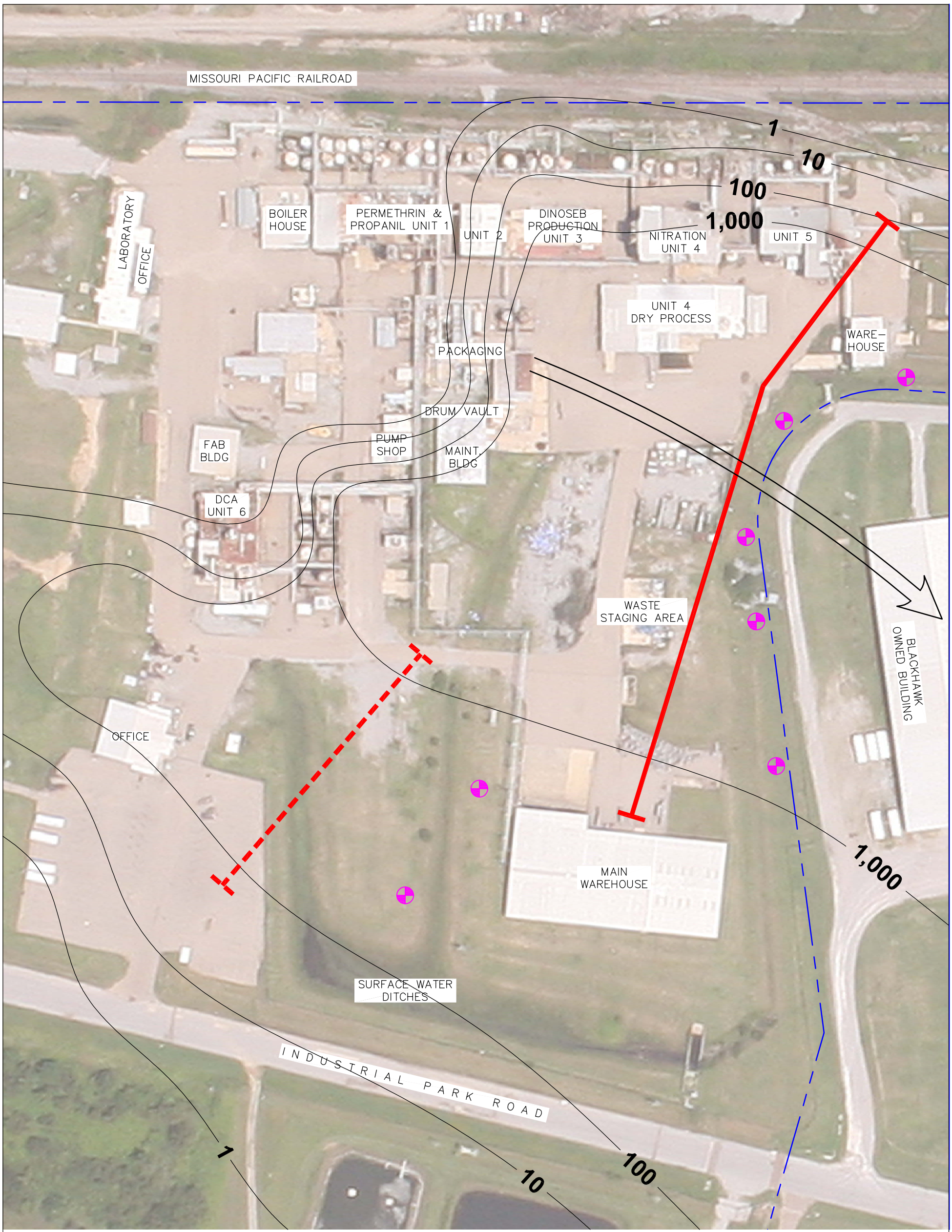
0 100 200
FEET

BASEMAP MODIFIED FROM:
Smith & Weiland/Cline-Fraizer Survey, August 2008

PERCHED ZONE GROUNDWATER
REMEDY ALTERNATIVE P6
Permeable Reactive Barriers
Cedar Chemical
Helena-West Helena, Arkansas

Figure XX

NOTE: Boundaries, well locations, and remedy elements subject to change based on Remedial Design or other factors.



EXPLANATION

- NEW MONITORING WELL
- ALIGNMENT OF INJECTION WELLS ON ~10' SPACING
- ALIGNMENT OF INJECTION WELLS ON 25' SPACING
- GENERAL GROUNDWATER FLOW DIRECTION
- —1,000— CONCENTRATION OF 1,2-DICHLOROETHANE IN GROUNDWATER AS OF SEPTEMBER 2008. UNITS ARE MICROGRAMS PER LITER (mg/L)
- PROPERTY BOUNDARY

NOTE: Boundaries, well locations, and remedy elements subject to change based on Remedial Design or other factors.

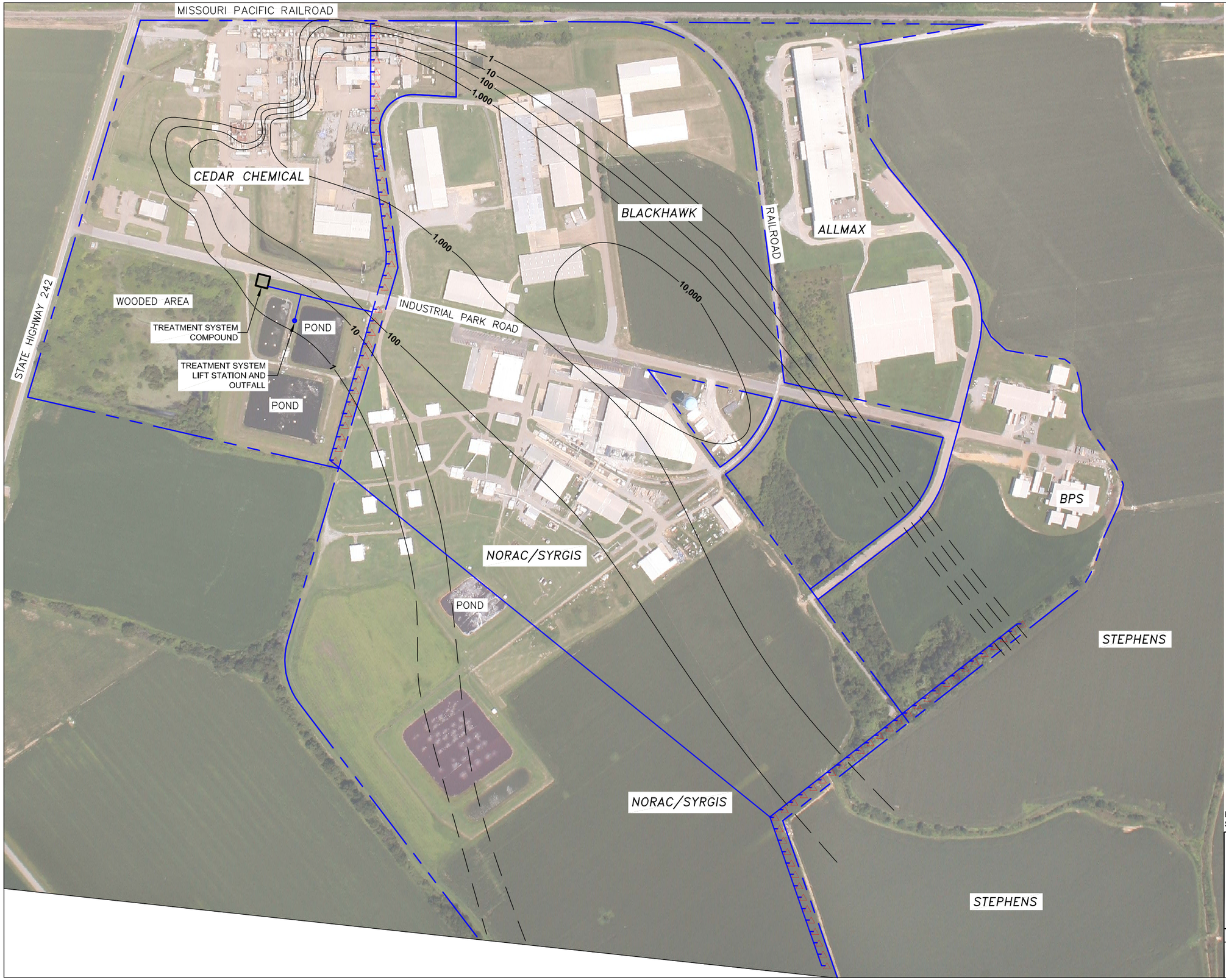
N

0 100 200
FEET

BASEMAP MODIFIED FROM:
Smith & Weiland/Cline-Fraizer Survey, August 2008

ALLUVIAL AQUIFER GROUNDWATER
REMEDY ALTERNATIVE A3
In Situ Enhanced Biodegradation
Cedar Chemical
Helena-West Helena, Arkansas

By: BAL	Date: 12/10/09	Project No. 13636.000
AMEC Geomatrix		Figure 15



EXPLANATION

- RECOVERY WELL CLUSTER (WELLS AT 70', 110' AND 150')
- PIPING
- PROPERTY BOUNDARY
- —1,000— CONCENTRATION OF 1,2-DICHLOROETHANE IN GROUNDWATER AS OF SEPTEMBER 2008. UNITS ARE MICROGRAMS PER LITER (mg/L)

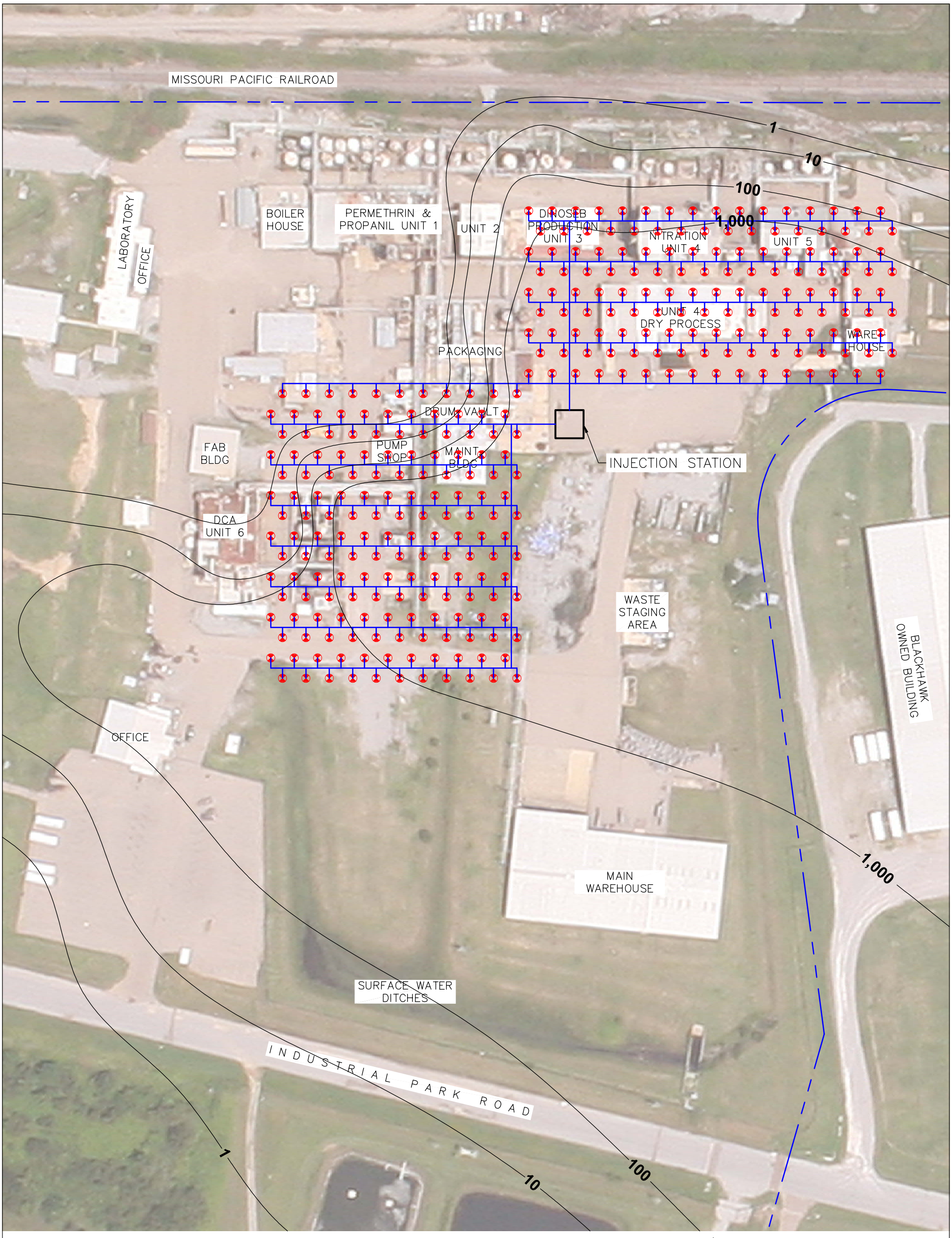
NOTE: Boundaries, well locations, and remedy elements subject to change based on Remedial Design or other factors.

0 100 200
FEET

BASEMAP MODIFIED FROM:
Smith & Weiland/Cline-Fraizer Survey, August 2008

ALLUVIAL AQUIFER GROUNDWATER
REMEDY ALTERNATIVE A4
Hydraulic Control
Cedar Chemical
Helena-West Helena, Arkansas

By: BAL	Date: 12/10/09	Project No. 13484.000
AMEC Geomatrix		Figure 16



EXPLANATION

- INJECTION WELL CLUSTER (3 WELLS PER CLUSTER)
- PIPING
- PROPERTY BOUNDARY
- —1,000— CONCENTRATION OF 1,2-DICHLOROETHANE IN GROUNDWATER AS OF SEPTEMBER 2008. UNITS ARE MICROGRAMS PER LITER (mg/L)

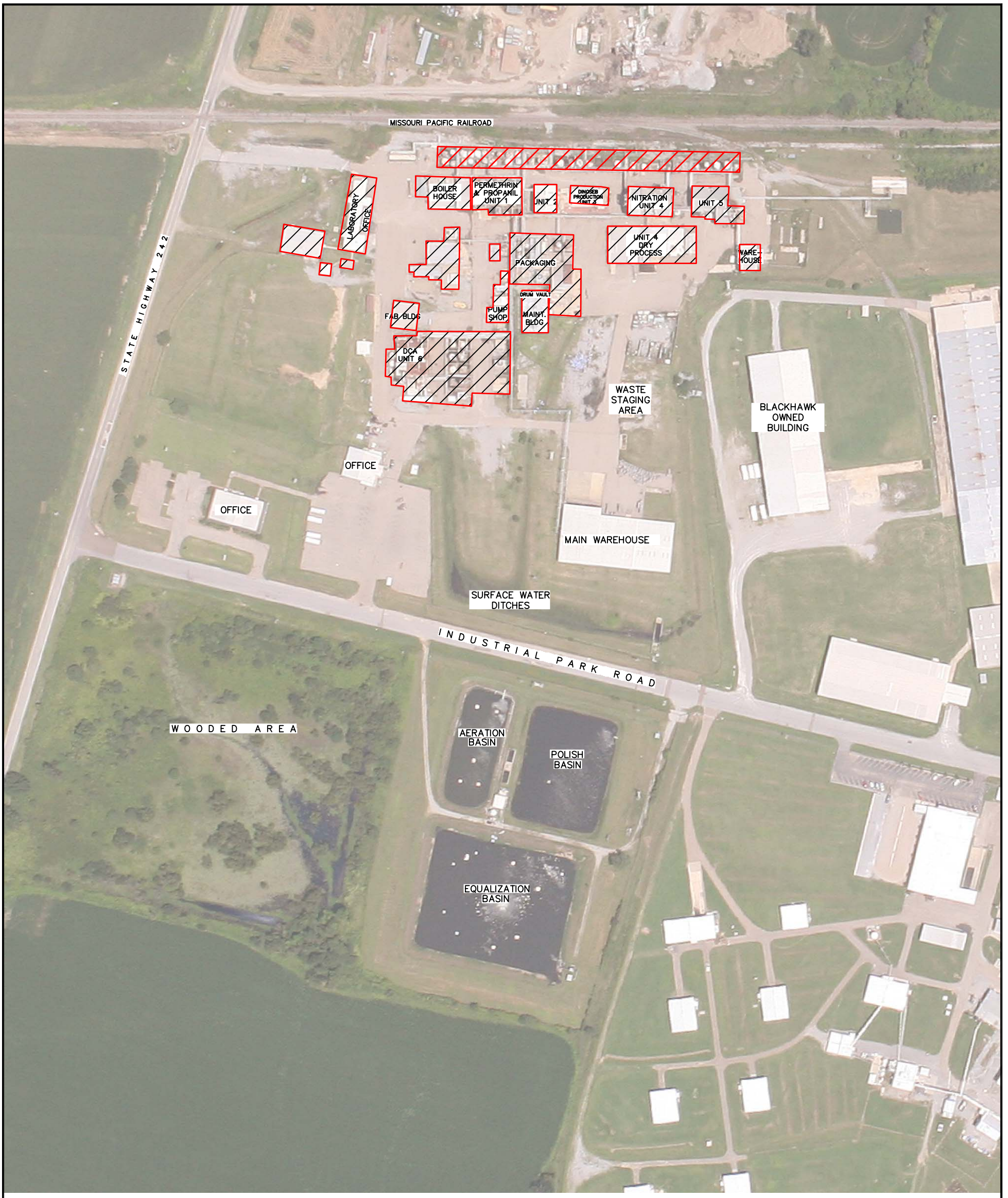
0 50 100
FEET

BASEMAP MODIFIED FROM:
Smith & Weiland/Cline-Fraizer Survey, August 2008

ALLUVIAL AQUIFER GROUNDWATER
REMEDY ALTERNATIVE A5
In Situ Chemical Oxidation
Cedar Chemical
Helena-West Helena, Arkansas

Figure XX

NOTE: Boundaries, well locations, and remedy elements subject to change based on Remedial Design or other factors.



EXPLANATION

BUILDINGS AND OTHER STRUCTURES TO BE REMOVED

NOTE: Boundaries, well locations, and remedy elements subject to change based on Remedial Design or other factors.

0 200

APPROXIMATE SCALE IN FEET

Demolition of On-Site Structures

Cedar Chemical
Helena-West Helena, Arkansas

Figure XX